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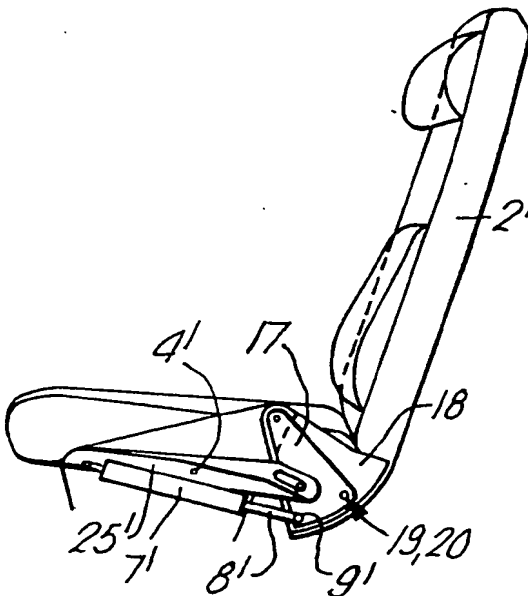
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(54) Title: AN ADJUSTABLE CHAIR



(57) Abstract

An adjustable chair in which the mutual angle between seat (1; 1') and backrest (2; 2') may be changed, with a stationary fixture (3; 3') provided at each of the sidepieces of the chair, with seat (1; 1') being mounted to be tiltable about a fixed point (4; 4') on the fixture and with backrest (2; 2') being mounted to be tiltable about a fixed rear point (5; 5') on fixture (3; 3'). Below said rear fixed point a spigot (12; 12') projects laterally from the lower portion of the backrest and is designed to slide in a slide groove (11; 11') which slopes rearwards, downwards in a side piece (25; 25') of seat (1; 1'). At least one mechanism (7, 8; 7', 8') of optionally adjustable length forms the connection between a mounting point (6, 6') of said fixture (3, 3') and a lower point (9, 9') of the backrest for activation of said mechanism to cause movement of the spigot in said slide groove. When the backrest is moved backwards the rear edge of the seat will tilt downwards, and when the backrest is moved forwards the rear edge of the seat will tilt upwards.

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An adjustable chair

5 The present invention relates to an adjustable chair the seat and backrest of which are mounted to be movable relative to each other on a common fixture at the side pieces of the chair, with movement between seat and backrest, at the same time, being controlled by a spigot in a guiding groove, the seat being mounted to be tiltable about a fixed point on the
10 fixture.

Numerous designs are known of adjustable chairs of the mentioned kind in which the mutual angle may be changed. Generally, however, tilting of the backrest backwards will
15 cause the rear portion of the seat to be moved upwards. This will cause back rest cushions which are preset for an upright position of the backrest, to move out of their correct position relative to the person sitting in the chair when the backrest is moved backwards. This will require
20 resetting of the backrest cushions in the tilted-back position which may, obviously, create certain problems. In a reclining position, it is also most comfortable to the user of the chair that the seat is also tilted slightly backwards. In most ordinary chairs the seat is, however, tilted to
25 approach a horizontal position, and the user may easily slip off the chair or the chair will, at best, be perceived as being less comfortable to sit in.

According to the invention an adjustable chair of the above
30 mentioned kind is thus proposed, the characterizing features of which appear from the following claims, as well as from the following disclosure with reference to the accompanying drawings.

35 Figure 1 shows the chair with its backrest in an upright position.

Figure 2 shows the chair with its backrest in a tilted-back position.

5 Figure 3 shows a modified version of the chair of Figures 1 and 2 in a folded position.

Figure 4 shows the chair of Figure 3 in an upright position.

10 Figure 5 shows the chair of Figures 3 and 4 in a tilted-back position.

Figure 6 shows the chair of Figures 3-5 in another modified version, in a folded position.

15 Figure 7 shows the chair of Figure 6 in an upright position.

Figure 8 shows the chair of Figures 6 and 7 in a first tilted-back position.

20 Figure 9 shows the chair of Figures 6 - 8 in a second tilted-back position.

25 The chair comprises a seat 1 and a backrest 2 which are mutually connected, partly via a stationary fixture 3 on each side piece of the chair, and a spigot 12, which projects laterally from the lower portion of the backrest and enters a slide groove 11 on a lateral member 25 of the seat at its rear portion. Said slide groove 11 is provided at an angle with the longitudinal axis of the seat, i. e. inclined rearwards and downwards.

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35 At its lower portion backrest 2 is provided with a fixture 13 the upper end of which is pivotally mounted at a point 5 to the above mentioned stationary fixture 3. Lowermost 10 on back rest fixture 13 there is a fastening point 9 for a mechanism 7, 8 of optionally adjustable length, in the preferred embodiment a gas spring which may also optionally

be locked in a desired position. In the shown embodiment piston rod 8 of the gas spring is rotatably connected with said fastening point 9, whereas the end of cylinder 7 is rotatably connected with a fastening point 6 on fixture 3. Fastening point 6 is indicated in Figures 1 and 2 at a short distance behind and below the tilting point 4 of seat 1 relative to fixture 3. The backrest is provided with a headrest cushion 16, although the number of cushions is here only intended to be an example and not to limit the invention.

When backrest 2 is moved rearwards at an angle α upon actuation of gas spring 7, 8 for relative movement of cylinder and piston rod, spigot 12 will be moved from the rear edge of slide groove 11 to the front edge of slide groove 11. At the same time the rear edge of the seat will tilt down and cause the seat proper to tilt at an angle β in a rearward direction. The advantage is thus achieved that cushions 15, 16 will remain at a correct position relative to the user, and that the user will at the same time experience a more comfortable sitting position since the seat is also moved slightly rearwards.

In the shown embodiment an especially simple tilting mechanism is achieved in connection with an adjustable chair.

Being quite conventional, the means of actuating said gas spring 7, 8 are not shown in the drawing.

It will be obvious that there is no need for more than one gas spring, e.g. centrally provided under the chair. However, it is also possible to provide one gas spring at each side piece. Also, it is not required that spigot 12 and slide groove 11 are provided at the side pieces of the chair, they may rather be provided approximately midway between the side pieces of the chair.

In Figures 3 - 5 fixture 3 is shown in a design slightly differing from that shown in Figures 1 and 2. It will appear, inter alia, that fastening point 6' of cylinder 7' is placed in front of and slightly beneath tilting point 4' of the seat 1' relative to fixture 3'. Furthermore, the lowermost portion of the backrest comprises two cooperating members 17 and 18. In the shown embodiment member 17 is substantially shaped like a circle sector and its pointed end is pivotally mounted at a point 5' on stationary fixture 3'. Member 17 is provided with a spigot 12' in slidable engagement with a slide groove 11' which is inclined downwards and rearwards in a side member 25' of seat 1'. The end of piston rod 8' of the gas spring is secured to member 17 at a point 9'. The other cooperating member 18 is also shaped like a circle sector and is at its pointed end pivotally mounted at point 5'. Backrest 2' is firmly mounted to member 18 so as to be turnable about point 5' of fixture 3'. Members 17 and 18 are provided with engaging members 19 and 20, respectively, e.g. spigots to prevent member 18 with its spigot 20 from turning beyond spigot 19.

When backrest 2' is, thus, tilted backwards from the position of Figure 3, its movement will be checked by engagement of spigots 19 and 20. Further backward tilting of backrest 2' occurs by activation of gas spring 7', so that point 9' on member 17 approaches gas spring cylinder 7'. Spigot 12' in slot 11' will then move to upper end of slot 11' causing the rear edge of seat 1' to tilt downwards - and at the same time the front edge of seat 1' to tilt slightly upwards - about tilting point 4'.

Obviously, fixture 3', side member 4' of seat, slot 11', member 17 with spigots 12' and 19, as well as member 18 with spigot 20 are present on both sides of the chair. It will also be understood that what is shown in Figures 4 and 5 has exactly the same mode of operation as in Figures 1 and 2,

apart from the difference as regards purely mechanical build up.

5 In Figures 6 - 9 another modification of the embodiment of Figures 3 - 5 is shown. The mode of operation of the embodiments in Figures 6 - 8 is basically the same as for what is shown in Figures 3 - 6, apart from the fact that spigots 19 and 20 are no longer active, cooperation of member 17 and backrest 2' with member 18 now being adjusted
10 by a gas spring 21, 22 cooperating with, e.g. a spring loaded slide 23 sliding in a groove 24 in backrest 2'.

15 In Figure 6 the gas spring is shown with its piston rod 22 completely extended and forming the connection with a free end of slide 23. The other end of the gas spring, the free end of cylinder 21, is pivotally mounted on member 17 at a point 19'. Due to the rotatable connection between slide 23 and rod 22, backrest 2' may be turned when the gas spring is operated. The slide will move upwards along groove 24 when
20 the angle between rod 22 and slide 23 has passed a dead point.

With the backrest in an upright position (Figure 7) and with the gas spring locked, slide 23 will be at the bottom of
25 groove 24. Backrest 2' is, thus, localized relative to seat 1'. In Figure 8 the relation between seat 1' and backrest 2' is as shown in Figure 7, since only gas spring 7', 8' is operated, so that the rear edge of seat 1' is tilted down at the same time as backrest 2' is tilted backwards, as
30 disclosed in connection with Figure 5.

In Figure 9 it is shown how backrest 2' may be caused to take a still more backwards tilted position than the position shown in Figure 8. This occurs by operating gas spring 21, 22
35 to make rod 22 move into cylinder 21 causing gas spring 21, 22 to extend approximately flush with slide 23.

By the aid of the above indicated concepts of turning seat and backrest of the chair, the user's lumbar region and neck will remain at the same points relative to the backrest in an upright sitting position and all the way to a reclined sitting position.

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PATENT CLAIMS:

1.

An adjustable chair the backrest (2; 2') and seat (1; 1') of which are mounted to be movable relative to each other on a common fixture (3; 3') at the side pieces of the chair, at the same time as movement between seat and backrest is controlled by a spigot (12; 12') in a guiding groove (11; 11'), seat (1; 1') being mounted to be tiltable about a fixed point (4; 4') on fixture (3; 3'), c h a r a c t e r i z e d in that fixture (3; 3') is firmly connected with the chair support, that backrest (2; 2') at its lower portion (13; 17, 18) is mounted to be tiltable about a fixed rear point (5; 5') on fixture (3; 3'), that said spigot (12; 12') projects laterally from the lower portion (10; 17) of the backrest, below said rear point (5; 5'), said spigot (12; 12') being designed to slide in said guiding groove (11; 11'), and said guiding groove (11; 11') being inclined backwards, downwards in a side piece (25; 25') of seat (1; 1'), that at least one mechanism of optionally adjustable length (7, 8; 7', 8'), known per se, e.g. a gas spring, forms a connection known per se between a mounting point (6, 6') on said fixture (3; 3') and a lower point (9, 9') of the lower portion (10, 13; 17) of the backrest by activation of said mechanism to cause spigot (12; 12') to move in guiding groove (11; 11'), so that the rear edge of seat (1; 1') will tilt downwards when backrest (2; 2') is guided backwards, and the rear edge of the seat is tilted upwards when the backrest is moved forwards.

2.

An adjustable chair as stated in claim 1, c h a r a c t - e r i z e d in that the mutual angle between seat and backrest is lockable in the extreme positions and between said positions by the aid of said mechanism.

3.

An adjustable chair as stated in claim 1 or 2,
c h a r a c t e r i z e d i n that said mounting point
(6, 6') is placed at a level below said fixed turning point
(4, 4').

4.

An adjustable chair as stated in one or more of the preceding
claims, c h a r a c t e r i z e d i n that said spigot
(12, 12') is placed at a level between said rear point (5,
5') and said end point (9, 9').

5.

An adjustable chair as stated in claim 3, c h a r a c t -
e r i z e d i n that mounting point (6) is placed behind
said fixed turning point (4).

6.

An adjustable chair as stated in claim 3, c h a r a c t -
e r i z e d i n that mounting point (6') is placed in
front of said fixed turning point (4').

7.

An adjustable chair as stated in one or several of claims 1-
5 or 1 - 4, and 6, c h a r a c t e r i z e d i n that
the lower portion of backrest (2') comprises two members (17,
18), that both members (17, 18) are essentially circle sector
shaped and at their pointed ends are mounted to be turnable
about rear point (5') on fixture (3'), said first member
being provided with spigot (12') which is to slide in guiding
groove (11'), and said second member (18) being firmly
connected with backrest (2'), and that both members are
designed to be fixated relative to each other.

8.

An adjustable chair as stated in claim 7, c h a r a c t -

e r i z e d i n that relative fixation of said two members is achieved by the fact that said first member (17) is provided with a first engagement means, e.g. a spigot (19), and that the second member (18) is provided with a second engagement means, e.g. a spigot (20), said engagement means being designed to limit maximum relative turning of said members and, thus, the maximum angle between backrest and seat.

10 9.

An adjustable chair as stated in claim 7, c h a r a c t - e r i z e d i n that relative fixation between said members (17, 18) is achieved by the fact that said first member (17) is provided with a mechanism (21, 22) of adjustable length, e.g. a gas spring, which is directed upwards towards the back rest and at its upper free end (22) is connected in an articulated manner with a slide (23) which is provided to be slidable in a groove (24) of the backrest.

20 10.

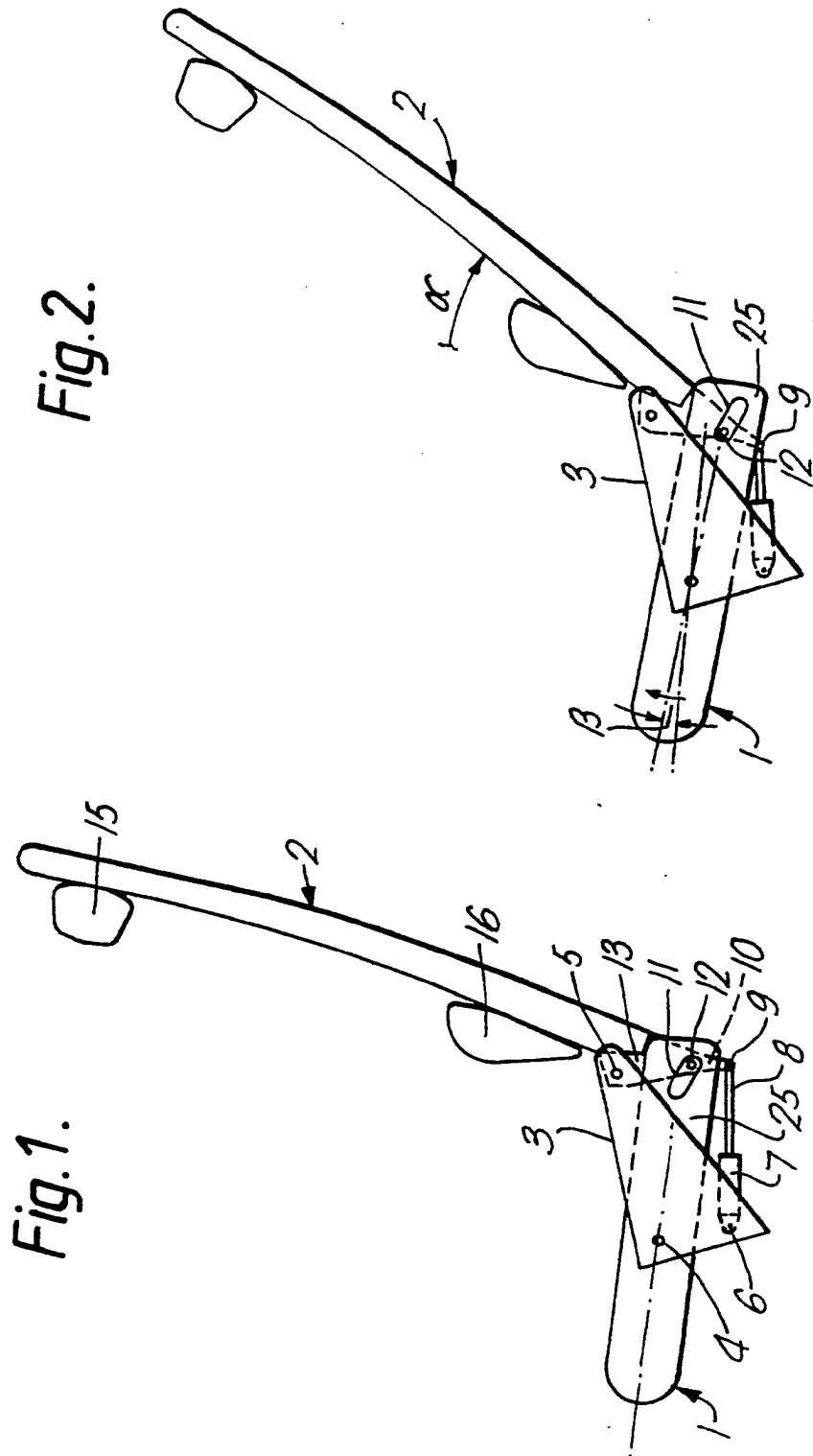
An adjustable chair as stated in claim 9, c h a r a c t - e r i z e d i n that slide (23) is spring loaded in the groove (24).

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Fig.3.

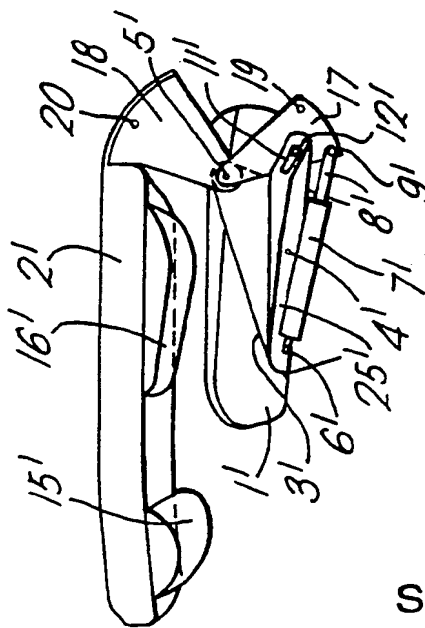


Fig.4.

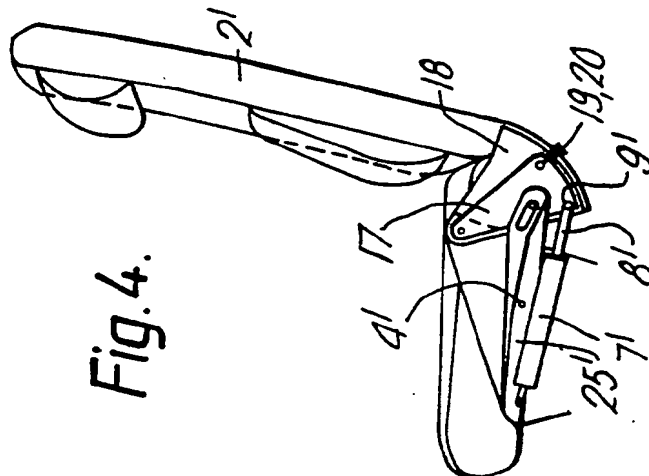
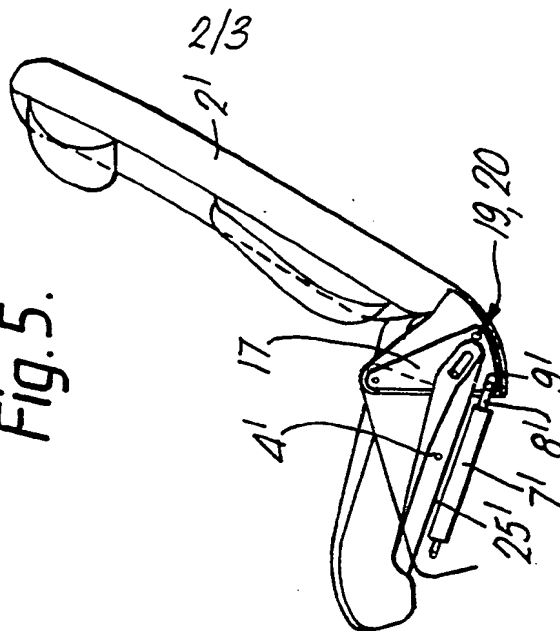


Fig.5.



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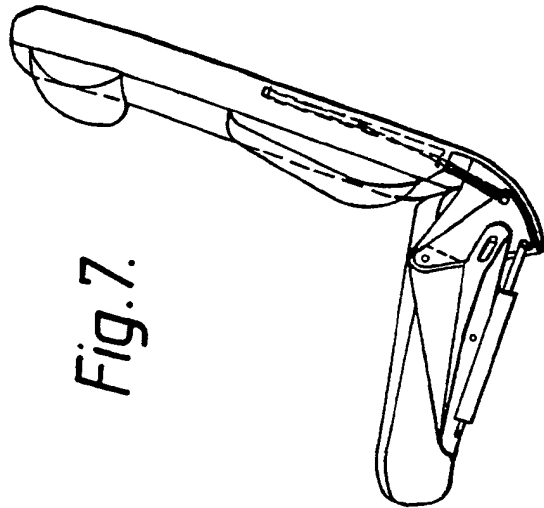


Fig. 7.

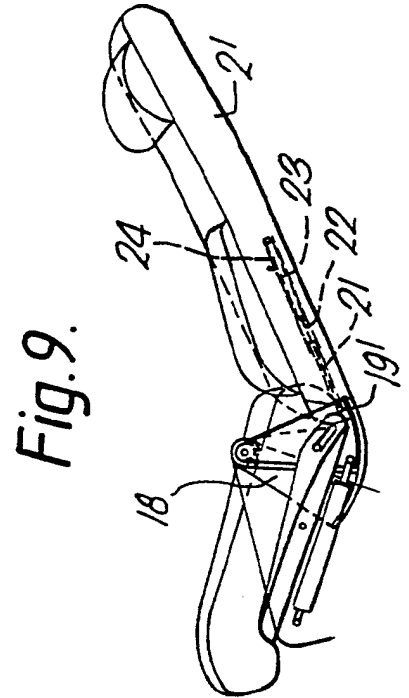


Fig. 9.

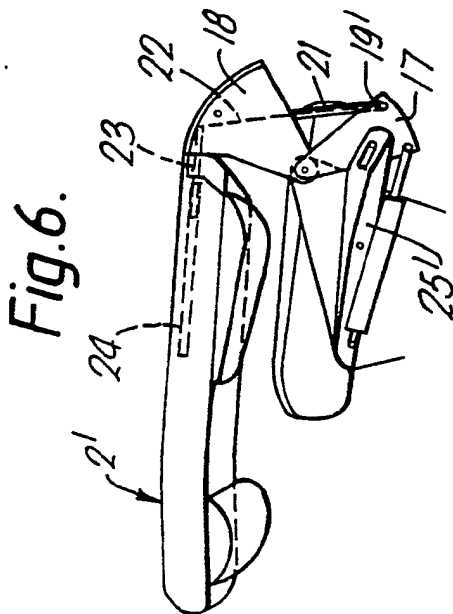


Fig. 6.

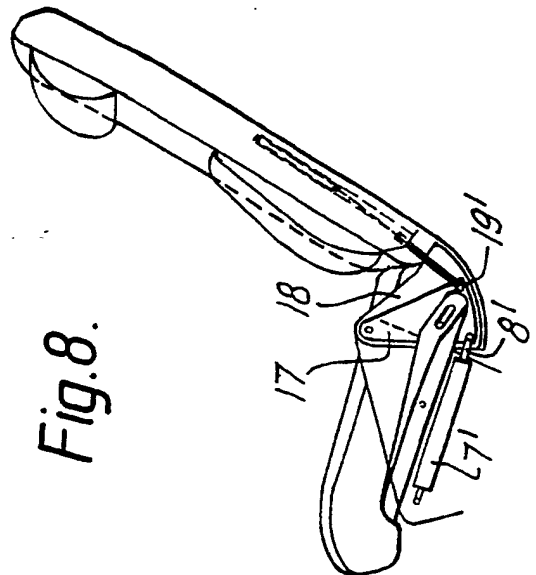


Fig. 8.

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INTERNATIONAL SEARCH REPORT

International Application No PCT/NO 90/00040

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: A 47 C 1/032																				
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="height: 40px; vertical-align: bottom;">IPC5</td> <td style="vertical-align: bottom;">A 47 C</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸</div> <p>SE,DK,FI,NO classes as above</p>			Classification System	Classification Symbols	IPC5	A 47 C														
Classification System	Classification Symbols																			
IPC5	A 47 C																			
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category[*]</th> <th style="border-bottom: 1px solid black;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 10%; border-bottom: 1px solid black;">Relevant to Claim No.¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>DE, A, 2026929 (DUPART, JEAN) 17 December 1970, see figures 3,4 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>EP, A2,263323 (INABA SEISAKUSHO CO., LTD) 13 April 1988, see figure 9 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>US, A, 2321385 (W.F. HEROLD) 8 June 1943, see figures 5,6 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>US, A, 2324902 (A. BENZICK ET AL) 20 July 1943, see the whole document --</td> <td style="text-align: center; vertical-align: top;">1,7</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>US, A, 4877291 (TAYLOR) 31 October 1989, see column 5, line 32 - line 35 -- -----</td> <td style="text-align: center; vertical-align: top;">1-5</td> </tr> </table>			Category [*]	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	A	DE, A, 2026929 (DUPART, JEAN) 17 December 1970, see figures 3,4 --	1	A	EP, A2,263323 (INABA SEISAKUSHO CO., LTD) 13 April 1988, see figure 9 --	1	A	US, A, 2321385 (W.F. HEROLD) 8 June 1943, see figures 5,6 --	1	A	US, A, 2324902 (A. BENZICK ET AL) 20 July 1943, see the whole document --	1,7	A	US, A, 4877291 (TAYLOR) 31 October 1989, see column 5, line 32 - line 35 -- -----	1-5
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>[*] Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																				
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border-bottom: 1px solid black;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="height: 40px; vertical-align: bottom;">10th September 1990</td> <td style="vertical-align: bottom; text-align: center;">1990 -10- 0 3</td> </tr> <tr> <td style="border-bottom: 1px solid black;">International Searching Authority</td> <td style="border-bottom: 1px solid black;">Signature of Authorized Officer</td> </tr> <tr> <td style="height: 40px; vertical-align: bottom; text-align: center;">SWEDISH PATENT OFFICE</td> <td style="vertical-align: bottom; text-align: center;">Nils Andersson <i>Nils Andersson</i></td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	10th September 1990	1990 -10- 0 3	International Searching Authority	Signature of Authorized Officer	SWEDISH PATENT OFFICE	Nils Andersson <i>Nils Andersson</i>										
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A- 2026929	70-12-17	FR-A- 2045120	71-02-26
EP-A- 263323	88-04-13	NONE	
US-A- 2321385	43-07-08	NONE	
US-A- 2324902	43-07-20	NONE	
US-A- 4877291	89-10-31	NONE	

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